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CHEMISTRY

No. 98

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CONTENTS

BRIEFS

PHOSPHORUS ISOTOPES--The "Radiopreparat" Enterprise of the Institute of Nuclear Physics, Uzbek SSR Academy of Sciences has begun industrial production of an unusual product--phosphorus-32 isotope. Microcontainers of this "substance," which is measured not in grams but in the number of atoms, have already been sent to scientific research institutes in Moscow, Leningrad and Novosibirsk. Phosphorus-32 isotope obtained by Uzbek scientists from an atomic reactor is needed for research in genetic engineering. This isotope serves as a unique tool allowing scientists to conduct intricate surgical operations on the living cell. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Dec 82 p 4] 11004

SCORPION VENOM ANALYSIS--Scientists of the Institute of Biochemistry of the Uzbek SSR Academy of Sciences have isolated a molecule of the toxic ingredient of scorpion venom, and they have decoded its structure. This molecule was found to be a protein. And as with all proteins, it consists of amino acids, vitally necessary to the organism. But these acids are arranged in a combination which is capable of causing serious unpleasantness to the body. "As with cobra venom, which was studied by our institute somewhat earlier," explained Uzbek SSR Academy of Sciences Corresponding Member B. Tashmukhamedov, "scorpion venom is of interest to science mainly as a tool for studying physiology. Knowing the structure of its molecule, we can now alter it purposefully with the purpose of studying how the body of an experimental animal would react to the venom." Biochemical and biophysical research on cobra and scorpion venom promises highly interesting practical results. It has been established, for example, that the substance making up the scorpion's weapon consists of three different venoms. They are strictly selective: One acts only on warm-blooded animals, another acts on insects, and the third is effective against crustaceans. "We intend to study, with especially great detail, and then synthesize the components of scorpion venom." [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Dec 82 p 4] 11004

CSO: 1841/114

UDC 576.095.6:662.749.35

CULTIVATING YEASTS ON LIGHT OIL FRACTIONS OF COAL TAR RESIN

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82
(manuscript received 15 Jan 81) pp 116-119

KUCHER, R. V., PAVLYUK, M. I., DZUMEDZEY, N. V. and TUROVSKIY, A. A.,
Institute of Physicoorganic and Coal Chemistry, UkSSR Academy of Sciences

[Abstract] Previous reported research suggests the potential of microorganism use for decomposing pollutants in sewage and the atmosphere. The present study utilized the title fractions from the Avdeyevskiy Coking Combine as growth culture. The light oil contained 26.74% benzene, 42.75% toluene, 15.06% xylene, 9.75% benzene derivatives, 2.29% napthtalene derivatives, 2.46% sulfur compounds and various unsaturated compounds. Candida tropicalis (strain K-41) was used in the tests. The yeast was adapted to light oil by gradual acclimatization with brewers must. In the actual tests each fraction of light oil tested served as the sole source of carbon and energy. Growth results showed that such substances as benzonitrile, naphthalene, aniline, mesitylene and dicyclopentadiene were growth inhibitors. Hence various detergents were added to counteract this, in theform of surface-active substances such as sodium laurylsulfate and "Synthanol-15." With this adjustment, the low-temperature light oils served as culture media and additives as growth stimulants. References 5 (Russian).
[93-12131]

UDC 541.128

SUPPORTED ORGANOMETALLIC CATALYSTS

Moscow KINETIKA I KATALIZ in Russian Vol 23, No 6, Nov-Dec 82
(manuscript received 16 Jun 82) pp 1374-1381

YERMAKOV, Yu. I., Institute of Catalysis, Siberian Branch, USSR Academy of Sciences, Novosibirsk

[Abstract] A review is presented of the current state and developmental trends in supported organometallic catalysis. Recent emphasis in research has been placed on the preparation of active complexes which cannot be produced by the traditional methods, as well as on the preparation of homogeneous catalysts of defined composition for studies on the mechanisms of catalysis. The successful preparation of high active, specific, and selective polynuclear cluster complexes utilizing the transitional elements will eventually lead to a more rational chemical understanding of multimetallic catalysis. Figures 2; references 37: 11 Russian, 26 Western.
[127-12172]

UDC 541.128

ZIEGLER-NATTA ORGANOMETALLIC CATALYSTS: NEW APPLICATIONS

Moscow KINETIKA I KATALIZ in Russian Vol 23, No 6, Nov-Dec 82
(manuscript received 17 Jun 82) pp 1382-1390

BOSKOVA, N. F. and SOKOL'SKIY, D. V., Institute of Organic Catalysis and Electrochemistry, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] The composition of various Ziegler-Natta catalysts are reviewed, showing that such complexes (including the polynuclear clusters) exist in a state of dynamic equilibrium. New applications of the catalysts include activation of alkanes under mild conditions, reduction of carbon monoxide to methane, positional isomerization and hydrogenation of lipids, hydrogenation of acetylene alcohols and acetylene admixtures in ethylene, and the reaction of methane with acetylene to form propylene and other hydrocarbon products. Figures 7; references 25: 22 Russian, 3 Western.
[127-12172]

UDC 541.128

CURRENT PROBLEMS IN CHEMICAL KINETICS OF HETEROGENOUS CATALYSIS

Moscow KINETIKA I KATALIZ in Russian Vol 23, No 6, Nov-Dec 82
(manuscript received 14 Jun 81) pp 1429-1438

KIPERMAN, S. L., Institute of Organic Chemistry imeni N. D. Zelinskiy,
USSR Academy of Sciences, Moscow

[Abstract] Current knowledge of the kinetics of heterogeneous catalysis is reviewed, and the major contribution of Soviet scientists are acknowledged. The central point is made that understanding reaction mechanisms requires the construction of appropriate mathematical models based on firm and extensive physicochemical data, as is the practice at the Institute of Organic Chemistry in Moscow. Successful models involve quantitative descriptions of the rate processes and incorporate various critical events, nonstationary processes, and relaxation times of the different components. Figures 1; references 28: 26 Russian, 2 Western.
[127-12172]

BASIC TRENDS AND PROBLEMS IN DEVELOPMENT OF ZEOLITE CATALYSIS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82 pp 7-34

MINACHEV, Kh. M. and ISAKOV, Ya. I., Institute of Organic Chemistry
imeni N. D. Zelinskiy, USSR Academy of Sciences

[Abstract] The authors review development of zeolite catalysts in the past 20 years, concentrating on materials since the First All-Union Conference "Use of Zeolites in Catalysis" (Novosibirsk, 1976). Topics discussed include expansion of areas of use for zeolite and zeolite-containing catalysts, one of the leading trends, with emphasis on oxidation of lower olefins into carbonyl compounds, condensation of beta-hydroxypropylenediamine with higher carboxylic acids forming 1-hydroxypropyl-2-alkyl-2-imidazolines, conversion of methanol or dimethyl ester into olefins, synthesis of methylcyclopropyl-ketone from acetopropylacetate, decomposition of 4,4-dimethylmethadioxane to obtain isoprene and other organic reactions, inorganic reactions, zeolites in pyrolysis processes and as catalysts and adsorbents, and various industrial applications such as catalytic petroleum cracking--isomerization of n-alkanes and aromatic hydrocarbons, alkylation of benzene by ethylene, deparaffination of distillates and oils, and other processes. A second, closely related trend includes synthesis and use of catalytic systems based on newly developed zeolites such as high-silicon pentacyl types. In these zeolites, stability as catalysts continues to be a problem. Further topics include catalysis on polyzeolitic systems, polyfunctional catalysis on zeolitic systems, zeolitic metal-complex catalysts, modification of zeolitic catalysts, and study of the structure of zeolitic catalysts, the nature of their active centers and the mechanism of their action. Figures 1; references 248: 98 Russian, 150 Western.
[93-12131]

PROSPECTS FOR PRACTICAL USE OF ZEOLITIC AND ZEOLITE-CONTAINING CATALYSTS IN INDUSTRIAL PETROLEUM PROCESSING AND PETROCHEMISTRY

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82 pp 51-61

RADCHENKO, Ye. D., All-Union Scientific Research Institute of the Petroleum Processing Industry

[Abstract] As oil becomes a problem in the USSR as elsewhere, and the quality of petroleum declines in the direction of crude oil with higher sulfur content, the need for more effective catalysts grows in order to fill ever more sophisticated demand specifications. In catalyst production, two contradictory factors are competing: the steadily growing importance of catalytic processes and improvements in the service life of catalysts. There is a clear trend to replace alumcobalt-molybdenum catalysts with alumonickel-molybdenum ones due to the scarcity of cobalt and the relatively higher activity of nickel in dearomatization and denitration processes. Developments at the All-Union Scientific Research Institute of the Petroleum Processing Industry and the Groznyy Scientific Research Institute are summarized. A modern microspheric cracking catalyst for selective isolation of gasoline, isobutane and isobutylenes is described. Basic principles for developing effective catalysts include knowledge of the effects of cation exchange conditions, of the medium of thermal processing and of reduction conditions. The application of ferromagnetic resonance to determining metallic nickel is discussed. Another important factor is the resistance of zeolite-metal catalysts to sulfur contamination. Other topics discussed are hydropurification of petroleum fractions, where regulation of the porous structure of catalysts has been shown to improve sulfur and nitrate removal properties, with applications in production of jet fuel and winter and summer diesel fuels; dearomatization and deparaffination, where a new catalyst labelled SGK-1 has been developed. Use of high-silicon zeolite catalysts has promise in both productivity and selectivity. References 4 (Russian). [93-12131]

SECOND GENERATION OF ZEOLITE-CONTAINING CRACKING CATALYSTS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82 pp 62-74

MIRSKIY, Ya. V., KOSOLAPOVA, A. P., LEONT'YEV, A. S., RABINOVICH, S. I., VARSHAVER, V. Ye., MACHINSKAYA, M. Ye., KOVAL'SKAYA, L. V., BELOVA, O. N., NESMEYANOVA, T. S. and LIMOVA, T. V., Groznyy, Petroleum Scientific Research Institute

[Abstract] Industrial uses of zeolite catalysts are overwhelmingly in petroleum processing, and they are used to process major amounts of crude oil. Furthermore, it is anticipated that even more use will be made of them in new processes. The authors discuss such development at the Grozno Petroleum Research Institute and the All-Union Scientific Research Institute for Petroleum Production. Topics include features of second generation zeolite-containing cracking catalysts, especially those involving rare earth metals

and possessing high thermal stability, catalytic activity that permits reducing to a minimum the negative effects of the matrix on the zeolite component, minimal specific surface area, and porous and globular structural features. Other topics include the zeolitic component of proposed cracking catalysts, with emphasis on Y-type zeolite, and concern for high cost and insufficient thermal stability of ultrasyl catalysts; structure and durability of zeolite-containing catalysts, and properties of second-generation cracking catalysts. Analysis of durability and structural parameters indicated that the contact of matrix globules with zeolite was slight, and zeolitic components in the matrix that created a new phase prevented development of microscopic faults at phase borders. References 29: 22 Russian, 7 Western.
[93-12131]

UDC 662.733.092

POTENTIAL PRODUCTION OF METAL-CARBON CATALYSTS BASED ON MODIFIED PEATS

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82
(manuscript received 27 Mar 81) pp 112-115

BEL'KEVICH, P. I., GAYDUK, K. A., TRUBILKO, E. V., BEL'SKAYA, R. I. and BEREZOVIK, G. K., Peat Institute, BSSR Academy of Sciences; Institute of Physicoorganic Chemistry

[Abstract] On the basis of previous study of ion-exchange properties of oxidized peat and kinetic principles of thermal decomposition of their salt forms, the authors determined the possibility of synthesizing highly selective catalysts and carbon-metal fibers. In the present study they continue work on a cobalt-carbon catalyst and its relation to the nature of the initial peat and the method for producing the catalyst, using various Belorussian peats. Results showed that oxidation caused the quantity of carboxylic groups in "Trostnikovyy" peat to increase by nearly a full order, while "Osokovyy" peat's content of carboxylic groups grew 2.5 fold. "Sosnovo-Pushitsevyy" peat was the most stable. Infrared spectroscopy indicated that the topography of oxidized samples had an important bearing on their active phase quantity, whether ion exhcange or steeping was used to effect oxidation. The elemental composition of initial and oxidized forms showed the increase in oxygen-containing compounds during oxidation and the preservation of that status during the transition to salt forms. Thus catalyst synthesis can be guided by selection of peat and changes in metal depositing methods, thermolysis conditions and oxidation.
References 4 (Russian).
[93-12131]

UDC 66.097.3:338.32.001.24

FEATURES OF CALCULATING CATALYST PRODUCTION CAPACITIES

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 82 pp 32-34

MANETOV, A. G. and VILENSKIY, L. Sh., All-Union Scientific Research and Planning for Oil Refining and Petrochemical Production

[Abstract] Since current procedures for determining productivity of equipment and manpower do not take changes in technology, materials or final products into account, an incorrect picture is obtained when production results are assessed and plans made. These problems also apply to catalysts; consequently, the authors have sought more meaningful parameters for such projections and evaluations. They suggest that productive capacities should be calculated on the basis of projected equipment standards, and where those are exceeded, on the basis of "state of the art" equipment. Catalysts with more than 3-month useful life and those with shorter effectiveness should be calculated according to differing formulas, the first using 25% of the highest productivity of equipment, and the latter using the best-24-hour productivity of the equipment as the standard. Typical calculations based on these approaches are presented, and the authors conclude that they permit more objective determination of the productivity of catalyst-producing enterprises.
[97-12131]

UDC 628.512:66.097.3.001.5

EVALUATING CATALYST ACTIVITY IN SANITARY PURIFICATION OF GAS EMISSIONS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 82 pp 34-35

MEZHIRITSKIY, Yu. A., FOKSHA, G. A. and KOLBASIN, I. S., Novokuybyshev Division, All-Union Scientific Research Institute for Hydrocarbon Raw Materials

[Abstract] The "pulsed microreaction gas-chromatography method" [Berezkina, MIR, 1972] measurement of just a few milligrams of catalysts and reactive mass. The authors used this method for monitoring oxidation of harmful components of industrial gas emissions and for investigation of the changes that take place in compounds such as ethalones, which oxidize with difficulty. Eight different catalysts were studied relative to their activity with methane, for example. Before tests, the catalysts were subjected to oxidizing regeneration to remove adsorbed organic products and coke deposits. Absolute calibration of peak heights, used to determine methane content, indicated the most effective catalyst to be "IK-12-2," and the least effective in removing methane to be an alumocobalt-molybdenum variant. With

palladium-containing catalysts, oxidation temperature had to be held at at least 540° C. The test method was shown to be sensitive to small quantities of catalysts and ethalone substances and can be used for purifying industrial gas wastes. Figures 3; references 4 (Russian).
[97-12131]

DEVELOPMENT OF CHEMICAL INDUSTRY IN BELORUSSIA

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 11, Nov 82 pp 6-8

[Article by Doctor of Chemical Sciences S. Markevich]

[Text] Formation of the USSR made it possible to significantly accelerate the development of the country's national economy. The economy of the national republics increased at advanced rates. As a result, it was possible to eliminate the economic lag typical in the past for the outlying districts of Russia within the shortest deadlines.

The chemical industry of Belorussia was created during the first 5-year plan. Such large enterprises as the Mogilev Synthetic Silk Factory, the Krichevka Rubber Products Plant, the Bobruysk Wood Hydrolysis Plant, a perfume factory, a colophony plant and a chemically pure chalk plant at Gomel, the Rechitsa Tannin Extraction Plant, the Kraskotsvet Plant at Loyev, the medicine (antibiotics) plant and the lactic acid plant at Minsk, the chemical products plant at Borisovo and a number of others appeared on the map of the republic.

The high technical equipping of large chemistry enterprises and the availability of qualified personnel, whom the entire country helped to train, and extensive development of socialist forms of organization of labor guaranteed a considerable increase of product per worker in the chemical industry. The main mass of produced product were products of extensive and complex processing of raw material--flotation oils, tannin extracts, higher grades of turpentine, pharmaceutical preparations, perfume products and so on--rather than semifinished products.

Development of the chemical industry contributed to strengthening and to an increase of the economic ties of Belorussia and the other union republics. Thus, for example, flotation oils were used extensively in nonferrous metallurgy plants located in different economic regions of the country. There was also a wide demand for synthetic silk and lactic acid. At the same time, Belorussia received many types of raw material and semifinished products from the other union republics.

During World War II, the fascist occupation forces destroyed or plundered all enterprises of the chemical industry. The total material losses inflicted on the republic by the invaders comprised 35 budgets of prewar 1940. The peoples

of the Soviet Union, strong in friendship and brotherhood, mutual assistance and support, helped Soviet Belorussia to heal the deep wounds of the war within historically short deadlines. As early as 1950, the industry of the BSSR reached the 1940 level. Within 20 years, this level was exceeded more than twelvefold and the republic's chemical industry was developing two or more times more rapidly than throughout the country as a whole.

A new impetus in development of the chemical industry was the May (1958) Plenum of the CPSU Central Committee. For example, enterprises for production of mineral fertilizers, chemical fibers, petroleum refining and petrochemistry, paints and varnishes, tire cord, mechanical rubber products and fiberglass appeared on the republic's industrial map. Take just mineral fertilizer production. Our republic now produces more than half of all potassium fertilizers produced in the country. During the 11th 5-Year Plan, the Beloruskaliy Association will increase mineral fertilizer production 1.4-fold, which considerably exceeds the control assignments. The success of the Soligorsk workers is the result of shock labor of a multinational collective, where Russians, Ukrainians, Poles, Tatars, Chuvash and Estonians--representatives of 32 nationalities of our country--are laboring in friendship together with Belorussians.

The second large fertilizer production enterprise is the Grodno Production Association Azot, the first unit of which became operational in 1963. Its product is ammonium nitrate, ammonium sulphate, urea and sulphuric acid. The ammonium nitrate, urea and sulphuric acid of this enterprise are at the level of the best worldwide products.

Phosphorus fertilizer production has been developed at Gomel on the basis of imported flotation apatites and sulphur. The Gomel Chemical Plant produces double granulated superphosphate and ammophos. A number of important measures has been implemented here during the past few years on technical re-equipping and increasing production efficiency. Capacities have been put into operation for production of complex mixed fertilizers. The Gomel workers have begun to use unique sulphuric acid additives in superphosphate production for the first time in the country.

Thus, a large complex of enterprises for production of potassium, nitrogen and phosphorus fertilizers has been developed in our republic. They are now making a worthy contribution to raising the yields of the fields and in fulfillment of the USSR provisions program.

Discovery of oil reserves in the Polessye and also laying of the Druzhba oil pipeline created favorable conditions for construction of oil refining enterprises. Their disposition more fully corresponds to the principle of bringing production closer to the immediate consumer of commercial products. The Novopolotsk and Mozyr oil refining plants are meant.

The first unit of the Novopolotsk Oil Refining Plant became operational in 1963. There is no equal to this enterprise in Western Europe in the scope of production. The existing plant installations and those under construction for preliminary oil refining are the largest in the USSR in capacity. Processes

of thermal cracking, catalytic reforming and production of sulphuric acid have been developed here and p-xylene, which in turn is the initial raw material for the Mogilev PO [production association] Khimvolokno, is produced. The largest combine for production of chemicals and primarily of polyethylene has been constructed on the base of the Novopolotsk Oil Refining Plant.

The Polotsk Glass Fibers Plant and commercial rubber products enterprises (Klichev and Bobruysk) are producing a valuable product for the national economy. The wood chemistry industry, traditional to Belorussia and which produces colophony, turpentine and other products for the country, is also increasing production volumes each year.

The chemical fibers industry was developed in our republic during the prewar years. The first large enterprise of this sector was the Mogilev Synthetic Fiber Plant. Destroyed during the war, it was not only renovated, but considerably expanded and converted to the Khimvolokno Association. The association operates on cellulose coming mainly from the northwestern economic region and produces viscose staple, silk, cellophane and crystalline sodium sulphate. Besides this product, the association has now considerably expanded the production of polyethylene terephthalate, which is used for manufacture of chemical fiber and other materials, and is one of the leading enterprises of this sector. Construction of the Svetlogorsk Synthetic Fiber Plant was begun in 1960. Since 1964, this enterprise has produced high-strength cord. Replacement of cotton cord with viscose, especially high-strength cord, increases the mileage of automobile tires no less than 1.5-fold. The tire combine at Bobruysk, which assimilated production of large-size tires for powerful dump trucks, tractors and truck-trains within compressed deadlines, was put into operation among existing enterprises in 1972.

A few additional facts that indicate the rapid development of the chemical and oil refining industry in our republic can also be cited. The main distinguishing feature of its development is the fact that the growth rates of the production volumes in these sectors are higher than the average throughout the industry. Thus, they increased 4.1-fold during only the two preceding 5-year plans, whereas they increased 2.2-fold throughout the republic's industry as a whole.

The second characteristic feature of development of the chemical industry is the growth of the unit capacities of installations and concentration of the production of chemical products and semifinished products in large industrial complexes. The growth of the unit capacities of installations was determined primarily by the greater production capacities of the chemical plants, on the one hand, and by the capabilities for a sharp increase of labor productivity and reduction of capital expenditures and production costs, on the other. Thus, whereas the annual output per worker comprises approximately 60,000 rubles in the chemical industry and 250,000 rubles in the oil refining industry, the output in other sectors, for example, in construction and machine building is 10,000-20,000 rubles.

Here are only two examples of the growth of unit capacities. Preliminary oil refining installations with capacity of one million tons were provided by the

initial plans at the Novopolotsk NPZ [oil refining plant] and they were subsequently re-equipped for 2.4 and 6 million tons. The capacities will now grow even more while the engineering service operator personnel will remain constant. The unit capacities in ammonia synthesis have been brought from 100,000 to 450,000 tons annually. But this is not the limit. A similar trend is also occurring in other processes of chemical technology, which of course also creates specific problems. Thus, some installations have approached the limit of transport and installation capacities in their overall dimensions and weight. For example, the weight of an ammonia synthesis column exceeds 300 tons.

We have obviously approached the phase when the capacity of installations should increase due to an increase of the rates of chemical reactions, when catalysts must be developed which would have many times greater activity and consequently would guarantee passage of a large quantity of raw material per unit time with the same or even smaller dimensions of chemical reactors, rather than due to an increase of the rates of chemical reactions.

The problem of utilizing chemical production wastes and of developing waste-free plants and also new sources of energy supply is becoming very acute. The USSR chemical industry now consumes 12 percent of all electric energy produced, whereas the specific weight of its commercial products comprises a little more than 6 percent. An important source of supplementing energy expenditures may become the wastes of nuclear power plants for physical initiation of chemical reactions at low temperatures and also methods of radiation catalysis.

The problem of developing nuclear chemical energy complexes has already arrived. It is these complexes that are the most promising base for future production processes and for future development of important Belorussian chemistry.

6521
CSO: 1841/115

UDC 662.74:628.3

OBTAINING CONCENTRATES OF MONO- AND BIATOMIC PHENOLS FROM MIXED WATER-SOLUBLE PHENOLS FORMED DURING HIGH-SPEED PYROLYSIS OF LIGNITES

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82
(manuscript received 6 Apr 81) pp 92-95

KAZAKOV, Ye. I., KORENEV, K. D., MOLCHANOVA, I. V. and BELOV, P. S.,
State Scientific Research Institute for Energy imeni G. M. Krzhizhanovskiy

[Abstract] High-speed pyrolysis of lignites yields solid semicoke, liquid and gaseous products. Utilization of phenol and homologs in the liquid phase is hampered by their low effectiveness as commonly used motor fuel antioxidants. The authors developed a new method for separating mixed extracted phenols into groups of homogeneous compounds using an earlier method of selective separation of pyrocatechins through their calcium salts. This approach led to approximately a 40° C interval in boiling point between monoatomic phenols (whose boiling point did not exceed 235°C) and remaining biatomic phenols (such as resorcin, boiling at 276.5°). The phenols were dissolved in butyl acetate of diisopropyl ester and then processes with a 16-17% aqueous solution of calcium phenolate. The results showed the high selectivity of the process which yielded 53.6% monoatomic phenols divided into 43.2% phenol, 42.7% cresols and 11.3% xylenols and ethylphenols, and leaving only 2.8% biatomic phenols. The pyrocatechin concentrate, amounting to 15.6% of the total, was composed more than 90% of o-dihydroxybenzenes. The second biatomic phenol concentrate contained 75-80% resorcin andiits methyl derivatives. This method offers a new approach to utilizing Irsha-Borodinskiy lignites. References 16: 12 Russian, 4 Western.
[93-12131]

UDC 553.983:66.094.3

STUDY OF ORGANIC SUBSTANCE OF OIL SHALE OF CHAGANSKIY DEPOSIT BY OXIDATION DESTRUCTION METHOD

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82
(manuscript received 20 Feb 81) pp 96-102

VESKI, R. E., PALU, V. A., BONDAR', Ye. B. and SIDOROVA, S. M.,
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[Abstract] The rich but sulfur-laden oil shales of the title deposit have received little study. The authors show the composition of test samples to have 56.7% organic matter; thus these oil shales fall among sapropelite coals. Results of oxidational destruction after rem val of carbonates and bitumoids included up to 99% extract yield when the shale was oxidized with nitric acid at 105°C. As the degree of oxidation increased the sulfur con- ent declined, from 8% after 5 minutes to 1% after 360 minutes. Gas chromatography of methylated ester extracts using diazomethane showed low content of chromatic components. Few aliphatic acids were present. These da a agree with ^{1}H NMR spectra, thus indicating the presence of complex structures that are alicyclical, since benzene-carboxylic acids in t se products are also rare. Features of the composition of t e tested oil shales such as content of dicarboxylic and benzene-carboxylic acids suggest that the low yield of aromatic acids and practical absence of aromatic proton signals in ^{1}H NMR spectra of high molecular products demonstrate the absence of aromatic structures that are resistant to oxidation, such as are found in humites. Figures 2; references 7 (Russian).
[93-12131]

UDC 662.67:66.060

THERMAL DISSOLVING OF TRANS-VOLGA SHALES

Moscow KHIMIYA TVERDOGO TOPLIVA in Russian No 6, Nov-Dec 82
(manuscript received 30 Feb 81) pp 103-111

VOL'-EPSHTEYN, A. B., SHPIL'BERG, M. B., BREGADZE, T. A., TUCHKOVA, T. A., GORLOV, Ye. G., RUDENSKAYA, I. M., RUDENSKIY, A. V. and SAMORODOV, A. V.,
Institute of Mineral Fuels

[Abstract] Due to their magnitude and location in the European USSR, sulfuric Trans-Volga shales have high prospects, but they must be processed by other than traditional thermal methods. Features of the title method are discussed, beginning with autoclave and production line tests and including processing and use of liquid products of thermal dissolving, distillation of mixed products of the process, material balance of processing sulfuric shales, filtering liquid products containing ash, hydrocarcking of

ash-free extract, characteristics of thermal dissolution products and principal procedures for thermal processing of sulfuric shales to obtain organic binders for road-building materials, energy and motor fuels. The tests determined the amount of organic matter and means for reducing sulfur content to acceptable levels. Parameters for the products obtained are given. Figures 3; references 7 (Russian).
[93-12131]

UDC 541.127:536.4

KINETICS OF SOOT FORMATION DURING THERMAL DECOMPOSITION OF HYDROCARBONS

Moscow KHIMICHESKAYA FIZIKA in Russian No 12, Dec 82
(manuscript received 19 Apr 82) pp 1687-1695

GORDIYETS, B. F., SHELEPIN, L. A. and SHMOTKIN, Yu. S., Physics Institute imeni P. N. Lebedev, USSR Academy of Sciences, Moscow

[Abstract] Supplementing earlier studies, the authors examined kinetic models of soot formation to obtain analytical descriptions of the interrelationships between various features of the process, such as initial conditions and rate constants of elementary stages. A standard two-stage model was used whereby, in the decomposition of the hydrocarbon molecule, active centers form which then develop into critical cluster particles, or soot formation nuclei, which are capable of further growth. The second state includes growth of soot particles through heterogenic decomposition reactions on hydrocarbon molecule surfaces, and also by the destruction of active centers on their surfaces. The reactions involved are expressed in a series of formulas. Soot formation is regarded in many ways to be similar to condensation. Changes in molecule concentrations and the time factor are also expressed as formulas. The analytical approach must be regarded as a model, for the actual soot formation mechanism may be much more complex, and must be clarified through suitable experiments that will focus closely on isothermal decomposition of hydrocarbons. Figures 2; references 9 (Russian).
[95-12131]

UDC 541.11.127

HETEROGENEOUS SELF-BRAKING OF BURNING FULMINATING MIXTURE

Moscow KHIMICHESKAYA FIZIKA in Russian No 12, Dec 82
(manuscript received 18 May 82) pp 1704-1710

AZATYAN, V. V., SKLYARENKO, V. I. and SHAVARD, A. A., Institute of Chemical Physics, USSR Academy of Sciences, Moscow

[Abstract] It has been difficult to establish the patterns of gas-phase reactions on fresh surfaces, particularly in an initial series of experiments. Therefore, surfaces have been prepared beforehand and certain factors have been accepted as conventions. Wherever conditions and pressure have been equal, the parameters have been dependent on the material and condition of the surface. The present study presents results concerning anomalies relating to quantitatively replicated self-braking based on a model branched-chain reaction of oxidation of hydrogen under static conditions. The surface of a quartz reaction vessel was covered with an even layer of sodium chloride. Transformation calculations and experimental data agreed and showed that self-braking of $2H_2 + O_2$ occurs over NaCl. Acceleration of burning was found to stop despite the fact that concentrations of initial reagents were higher than the quantitatively measured maximum concentrations. Other factors show that along with the significant elevation of experimental rates and degrees of conversion over calculated values--which failed to consider heterogeneous development of chains and reduced effectiveness of heterogenic chain breakdown--some surfaces had a contradictory tendency which must be considered in attempting to establish principles of self-braking.
Figures 3; references 19: 17 Russian, 2 Western.
[95-12131]

UDC 662.612.2

MODELING KINETICS AND MECHANISM OF CHEMICAL REACTIONS IN AMMONIUM PERCHLORATE FLAMES

Moscow KHIMICHESKAYA FIZIKA in Russian No 12, Dec 82
(manuscript received 3 May 82) pp 1711-1717

YERMOLIN, N. Ye., KOROBEYNICHEV, O. P., TERESHCHENKO, A. G. and FOMIN, V. M., Institute of Chemical Kinetics and Combustion, Siberian Division, USSR Academy of Sciences, Novosibirsk

[Abstract] Reactions between products of gasification of the condensed phase form an important stage in the title combustion, but due to their complexity little has been published on them. The authors sought to check the accuracy of earlier studies that based their information on equations that considered transitional properties of the mixture such as viscosity, heat conductivity and diffusion. Findings were compared with experimental

data showing actual temperature distribution, concentrations of ClO and HNO radicals and stable components in the ammonium perchlorate flame. Under experimental conditions, radicals and atoms recombined on the walls of the test vessel, forming a definite part of stable "spent" products of the reactions. Data indicate that the calculated values for surface temperature are low by some 50° C, or else that no balance occurs on the burning surface. The experiments made it possible to construct a model of the combustion of condensed systems based on ammonium perchlorate that takes the actual kinetics of the flame into account. Figures 2; references 11: 8 Russian, 3 Western.
[95-12131]

UDC 536.46

KEY FEATURES OF HEAT AUTOIGNITION IN REACTING SYSTEMS WITH TWO-STAGE REACTIONS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 4, Dec 82 (manuscript received 2 Jul 82) pp 866-869

LYUBCHENKO, I. S. and MARCHENKO, G. N. (presented by Academician N. M. Emanuel 28 May 82)

[Abstract] Thermographic and thermogravimetric study of the kinetics of thermal decomposition of condensed substances has shown that the actual processes have many stages and generally each must be considered in a macrokinetic analysis. The authors have used an asymptotic method and here seek to generalize on key features of thermal explosions during two-stage parallel reactions, with simple and self-accelerating stages, or consecutive exothermal reactions that are not self-accelerating. Thermal and material balances of substances at atmospheric temperature are presented for both reaction alternatives. With the competing reactions, the authors were able to show calculations to explain all key features. The kinetics of consecutive reactions are also explained, with minor divergences in data. References 11 (Russian).
[92-12131]

UDC 662.581

NEW VARIATION OF SPIN COMBUSTION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 4, Dec 82
(manuscript received 14 Jun 82) pp 869-872

MERZHANOV, A. G., DVORYANKIN, A. V. and STRUNINA, A. G., Department of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka, Moscow Oblast (presented by Academician N. N. Semenov 14 Jun 82)

[Abstract] In studying combustion of cylindrical samples pressed from metal powders it was discovered that the combustion reaction was localized not in a flat layer, but in a spiral trajectory. The authors studied a new form of this so-called spin combustion, wherin a two-directional spiral trajectory was observed to move along the flat surface after local initiation. The test samples were of ferrozirconium thermite with ignition by a chrome-zirconium stoichiometric mixture. Analysis of the burned sample showed that the combustion process developed in the same manner on upper and lower planes, with some spatial shift. Increased compression of the powder metal tablets reduced the likelihood of this spin combustion and slowed its appearance. Transition from this spiral form of combustion to previously reported screw-thread burning of cylindrical samples, shows some differences. Further research is suggested to discover additional surface autooscillations and develop a general theory concerning this type of combustion. Figures 4; references 7: 6 Russian, 1 Western.
[92-12131]

FERTILIZERS

BRIEFS

POLYMER FERTILIZERS FOR COTTON--Cotton yields of a number of farms in the Golodnaya, Dzhizakskaya and Karshinskaya steppes grew by almost a quarter owing to polymers. Scientists of the Chemistry Institute of the Uzbek SSR Academy of Sciences are the first in Soviet practice to create a new form of "fertility vitamins" for saline and arid virgin soil in cooperation with their colleagues in Moscow. In addition to traditional nitrogen and phosphorus, they have added components consisting of formaldehyde and urea to the granules. These chemicals are what have compelled plants to assimilate nutrients more actively. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 23 Dec 82 p 4] 11004

LONG-ACTING FERTILIZER--Kingisepp, Leningrad Oblast--Mineral fertilizers introduced into the soil once will now be able to provide nutrients to plants for several years. The first batch of such granules, which dissolve slowly in soil water and which do not leach out from the soil for a long period of time, was produced by the Kingisepp "Fosforit" Association. A time and a half less phosphate raw material is consumed in production of the new fertilizers, and the impact of their action is the same as that of highly concentrated substances, for example double superphosphate. This fertilizer production association, the largest in the country's northwest, is expanding the assortment of its products. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Dec 82 p 1] 11004

PEAT PLANT OPERATIONAL--Olayne, Latvian SSR--The production complex of the Olayne Peat Plant, which was placed into operation ahead of schedule, will make it possible to satisfy the demand of several Latvian agroindustrial associations for peat to make compost. Its output capacity is 150,000 tons of products per year. The complex was built on a self-help basis. The entire volume of work was completed in 8 months, as opposed to a norm of 2 years. Similar production operations are also being created in other areas of Latvia. Joining the effort to implement the Food Program, Latvian peat diggers have planned to significantly expand extraction of this raw material. This year they increased peat deliveries by a fourth. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Dec 82 p 1] 11004

NEW GRANULATED FERTILIZER UNIT--Cherepovets--A new high-capacity granulation unit of the Cherepovets Nitrogen Fertilizer Plant has produced its first 10 tons of ammonium nitrate. It will produce fertility granules for the nonchernozem zone. The new facility is equal in output capacity to two others now in existence, but it was built in record time--in 8 months. This success was achieved owing to

efficient coordination of builders, assemblers, equipment suppliers and operators according to the "worker's relay" principle. The chemists have promised to raise the machine unit's output to its planned capacity a month ahead of schedule. [by V. Minin] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Jan 83 p 2] 11004

CSO: 1841/114

INSPECTION REVEALS CAUSES OF MINERAL FERTILIZER LOSSES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Dec 82 p 3

[Article by Yu. Sakulin, instrument controller, weak nitric acid shop, Berezniki Nitrogen Fertilizer Plant; A. Vanyukov, director, industry department, city newspaper BEREZNIKOVSKIY RABOCHIY; A. Sergeyev, chairman, main people's control group; B. Yermakov, senior operator, Shop No 1, Salavat Chemical Plant; A. Merkur'yev, editorial department director, city newspaper LENINSKIY PUT', Salavat; N. Gun'kin, brigade leader, rail car repair fitters; A. Nilov, concentration factory fitter; and P. Yakunin, diesel locomotive machine operator, chairman, shop people's control group, Kingisepp "Fosforit" Production Association: "Where Millions are Lost"]

[Text] As we know, mineral fertilizer production is developing at a rapid pace in our country. Deliveries of artificial fertilizer to agriculture tripled in the last 15 years. The Food Program adopted by the May Plenum of the CPSU Central Committee foresees raising production of "fertility vitamins" to 30 million tons per year by 1990.

However the sector is unable to meet its targets. In 11 months chemists became indebted by more than a million tons of fertilizers.

The editor's office has been receiving letters from people asking why the chemists sometimes subject their associates in the field to a starvation ration. At the request of the readers the editor's office conducted an unannounced inspection of the work of some lagging enterprises producing mineral fertilizers.

In the Shops

Here is a situation which recently arose at the Konstantinovsk Chemical Plant. We should immediately point out that it is a typical one. The equipment of the conveyor line that moved finished products to the warehouse was "ridden roughshod" without overhaul and current repairs until it stopped. As a consequence 800 tons of granulated superphosphate had to be left beneath the open sky. A significant part of it spoiled. Of course, this incident was not left unattended.

The main culprit was the shop chief, Yu. Yesin, who suggested a few seemingly objective excuses in his defense: There were supposedly no conveyor belts, the repair services were poorly outfitted and many others. And essentially, naming these excuses he portrayed himself as a helpless individual and an incapable supervisor, because all of the problems that had not been solved in time were all within the realm of his responsibility.

"Objective" causes leading to failure of plans and obligations of entire collectives very often conceal carelessness and the inability of concrete people to work prudently. Take as an example carbamide production at the Rustavi Chemical Plant. It has now already been a year that this once high-output facility has been shut down. Little by little its equipment was cannibalized, and parts were taken to other shops. Plant director G. Gogoladze and the party committee obviously need to determine whether or not things are going well with their chief mechanic's service.

Unfortunately what happened at the Rustavi Chemical Plant is also happening at other enterprises in the sector, where once again thought is given to the equipment only after it reaches a critical state. With such operation, failures of obligations between associates are, to put it bluntly, preplanned. The only thing is that no one knows exactly when the failures will occur.

The weak nitric acid shop of the Berezniki Nitrogen Fertilizer Plant supplies one of the basic components used in acquisition of ammonium nitrate, a highly effective mineral fertilizer. Four gas turbine units installed here can produce not less than 480,000 tons of weak nitric acid per year.

"Today only three of the units are working," explained shift chief S. Titov. "One was sent out for repairs, but instead of 5 days, replacement of a rotor dragged on for 2 weeks."

And meanwhile the workers of Berezniki are accumulating their debt to agriculture. What is still worse is that the operating units are not working at full output. The equipment of many of the shops has worn out. The explanation given to us is that the repair base is weak. But who is supposed to be showing concern for this? After all, the ministry did allocate sufficient assets to improve the repair service. Take at least the following example. Ten years ago the workers of Berezniki began fundamental reconstruction. They renewed the equipment, and they built a new carbamide shop at a cost of 15 million rubles. But they have not yet assimilated a single kopeck to create the mechanical services.

In Salavat, Bashkir ASSR, there is a specialized trust called "Salavatnefte-khimremstroy." It is obligated to perform preventive maintenance on the equipment of the Salavat Chemical Plant. But this work was ignored to such an extent that in the end, all of the main shops had to be subjected to overhaul on a crash basis. As a result mineral fertilizer production was stopped.

For similar reasons promises given to associates are not being kept by collectives of the Dorogobuzh Nitrogen Fertilizer Plant, the Rustavi Chemical Plant, the artificial nitrogen fertilizer plant in Togliatti, the Kemerovo "Azot" Production Association and other of the ministry's enterprises. A significant

part of that million tons of lost "fertility vitamins" which we discussed at the beginning of the article is upon the conscience of namely these collectives.

At the Warehouses

One reason of no small importance for losses of mineral fertilizers is their low quality. Sometimes fertilizer known to be spoiled is sent to the farms. But as a rule, the technical control services look the other way.

The superphosphate shop of the Konstantinovsk Chemical Plant produces fertilizer with a minimum concentration of the main useful ingredient. But in order that even this nutrient level could be preserved, the product must be allowed to "ripen"--that is, it must be placed in special areas or warehouses in which a bridge crane could mix it several times. But as a rule these areas are occupied by other products ready to be shipped. And so the superphosphate is sent to the consumers without any "ripening."

The chemists give the excuse that there is not enough warehouse space. This is in fact so. The warehouse availability in the sector satisfies 40 percent of the demand. But even the space that is available is being utilized in far from the best manner. In the Novgorod "Azot" Production Association a significant proportion of the fertilizers transforms into lumps and chunks before even leaving the plant warehouses. The roofs of the warehouses leak, rain falls on the mountains of fertilizer, and in winter they become covered with snow. There can be no name for this other than mismanagement.

The same association built a modern mechanized warehouse with a capacity of 20,000 tons of ammonium nitrate. But it is still standing empty: Something in it has not yet been finished, some things are not quite adjusted, and some other things there just aren't enough people to do. There is no place to put the nitrate. When there are no rail cars, production grinds to a halt. Thus it happens that the output capacity of the ammonium nitrate shops is being utilized here to only 60 percent. A certain part of the lost million should be sought here as well.

On the Road to the Fields

But yet, the specialists assure us, the main losses occur during transportation of the mineral fertilizers. This means that to the million which the sector's lagging enterprises have failed to produce, we must add some more lost en route. These losses are sizeable as well. Workers of the Central Institute of Agrochemical Services to Agriculture have the following depressing statistic: Up to 15 percent of the fertilizers are lost on the road from the enterprise to the fields.

"Shop No 1 will not receive rail cars today," said the director of the Salavat Chemical Plant.

What this telephone message meant to Shop No 1 we came to understand on visiting the warehouse. The racks of paper sacks of mineral fertilizer were heaped almost

up to the ceiling. Double the standard amount of finished products have accumulated here: There are no rail cars.

The poor supply of rolling stock to this plant was already discussed in the article "To the Warehouse Instead of the Fields" published in SOTSIALISTICHESKAYA INDUSTRIYA on 16 May of this year. But nothing has changed. The Bashkir department of the Kuybyshev Railway is showing a lack of concern for the needs of Salavat chemists.

But if things are this bad with rail cars, there can probably be only one solution: The chemists and railroaders must make a bolder effort to work together. After all, there are good examples of cooperation. One of them was demonstrated by Kingisepp chemists, who began repairing rolling stock by their own effort. The "Fosforit" Production Association organized five brigades working around the clock to repair rail cars. At first the lumber situation was very difficult. There were not enough funds, but cars, full of holes, kept coming year-round. And so people were contracted to cut timber. Now lumber of all sizes is available when needed.

"Fosforit" has been working this way for 3 years. The main result is tens of thousands of tons of mineral fetilizer saved, fertilizers which would otherwise have spilled out en route. Rail car idleness has been almost halved. In comparison with last year the fines for idleness have decreased by 50,000 rubles.

The chemists understand the difficulties of the railroads. This is all the more reason for the railroaders not to forget some sort of guarantees in response. The rail cars leave "Fosforit" in good condition, but they never return to the association. Others come, in worse condition than the last. And so we find that the saying holds true: "The rich get richer and the poor get poorer." We would like to know what A. Solobuto, chief of the Oktyabr'skaya Railway, and D. Treshenko, depot chief of the Leningrad-Vitebsk department, who signed a bilateral agreement with the Kingisepp "Fosforit" Association, think about all of this.

The railroaders are presently indebted to the country's chemists. Just in October the requirement for rail cars to carry mineral fertilizers was satisfied 15,000 short. All of this has placed fulfillment of the 1982 plan in jeopardy.

11004
CSO: 1841/121

NITROGEN FERTILIZER PLANT'S HISTORY SKETCHED

Ashkhabad KOMSOMOLETS TURKMENISTANA in Russian 14 Aug 82 p 2

[Article: "The DZAU--Komsomol Shock Project"]

[Text] What is the Dorogobuzh Nitrogen Fertilizer Plant? Here are just a few eloquent figures: The shops of this mineral fertilizer production enterprise, the largest in the country and one of the largest in Europe, occupy more than 300 hectares;

each year the plant sends more than 2 million tons of various fertilizers to consumers--ammonia water, nitrophos, liquid ammonia and ammonium nitrate. A significant proportion of the plant's products are exported--to the GDR, Poland, Bulgaria and Cuba. The DZAU [Dorogobuzh Nitrogen Fertilizer Plant] is the main supplier of fertilizers for all of the nonchernozem zone, Belorussia and the Ukraine;

more than 400,000 persons toil at the plant, one out of every two workers of the DZAU is less than 30 years old, and one out of four is a Komsomol member. In 1964 the Dorogobuzh Nitrogen Fertilizer Plant became an all-union Komsomol shock construction project.

V. P. Poplavskiy, secretary of the DZAU party committee, describes the plant's history and its glorious people.

"Twenty-one years ago a special commission came to Dorogobuzh to determine the location of a future giant of chemical industry, the first enterprise of this sort in Smolensk Oblast. The scale of the construction jobs that were to be completed was very impressive. The "Dorogobuzhkhimstroy" Trust, specially created for construction of the plant, and 17 other organizations began work in 1963. The entire country built the plant. The international nature of this first representative of "big chemistry" in Smolensk Oblast manifested itself especially clearly after the nitrogen fertilizer plant was proclaimed an all-union shock Komsomol construction project. Many unforgetable, heroic pages were entered into the history of the plant by Komsomol representatives from the Ukraine and Belorussia from Georgia and Turkmenistan, Latvia, Lithuania and Moldavia.

The country needed mineral fertilizers. Only they could insure the growth in agriculture yields and in the productivity of animal husbandry foreseen by the

March (1964) CPSU Central Committee Plenum. All builders of the DZAU were clear on this point. By as early as December 1965 the plant began putting out its first products: For an enterprise of this scale, this was record time. The plant workers managed to reach their planned output capacity ahead of schedule, in just 8 months. But development of the plant did not stop here. In 1972 a catalyst factory, the first such production operation in our country, was put into operation here. In the 9th Five-Year Plan a complete fertilizer complex containing a sulfuric and nitric acid production operation and a nitrophos shop began producing. Since that time the plant's role in development of agriculture in the nonchernozem zone climbed to a new height. The latter part of 1979, when a letter of greeting written by CPSU Central Committee General Secretary L. I. Brezhnev to the builders, planners and operators of the high-output ammonia production shop was received, will be a page of the plant's history that will never fade. A second set of weak nitric acid and ammonium nitrate production units was placed into operation at the end of 1980. The plant's present production level is more than 80 million rubles of products annually, and in many ways it determines the level of development of the country's agriculture.

New tasks were posed to mineral fertilizer industry by the May (1982) CPSU Central Committee Plenum. Our plant collective clearly understands the entire complexity and importance of the tasks of the Food Program. A socialist competition that evolved at the plant under the slogan "An honorable welcome for the 60th anniversary of the USSR" is a mobilizing force, and as always, many young communists and Komsomol members are among the competition leaders. Young men and women of the young Komsomol extrusion machinery shop are laboring excellently, and the young Komsomol collectives of the biological treatment and nitrophos shops have been credited with many glorious deeds.

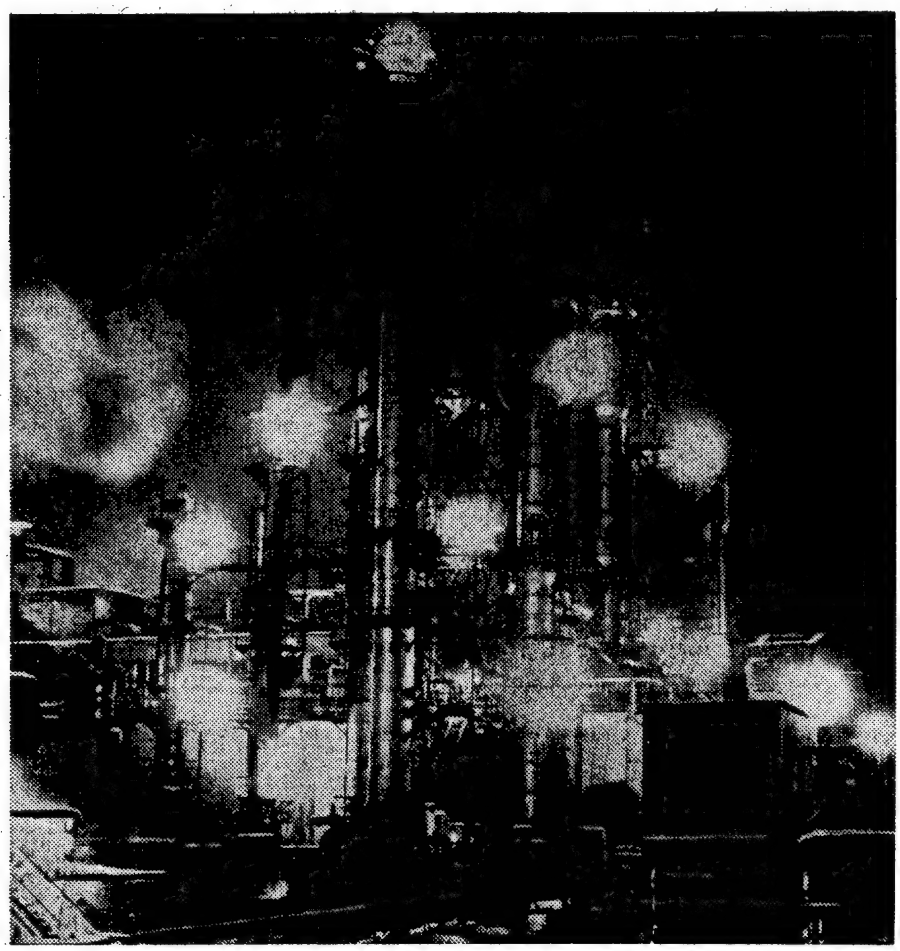
The Dorogobuzh Nitrogen Fertilizer Plant is a young enterprise. There are many glorious deeds still to be done. We believe that the young plant will honorably perpetuate the traditions of its elders and will make its contribution to the chronicle of the heroic accomplishments of the Soviet people.

These days warriors of student construction detachments from the Turkmen SSR are laboring excellently at the DZAU.

11004
CSO: 1841/114

KEMEROVO MINERAL FERTILIZER COMPLEX CONTRIBUTES TO COUNTRY'S AGRICULTURE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Dec 82 p 1



[Text] The Kemerovo "Azot" Production Association is the largest supplier of mineral fertilizers to agricultural laborers of Siberia, the Far East, Central Asia, and Kazakhstan. There are plans for increasing the production volume of this enterprise's fertility shops. A number of new production operations are to be built in the current five-year plan. Some of them have already gone to work.

The largest of them is the carbamide production operation. It will provide agriculture with 450,000 tons of valuable mineral fertilizers in which the nitrogen concentration is significantly higher than in traditional ammonium nitrate. Owing to this, labor outlays will decrease and fewer rail cars would be needed to carry the fertilizers.

On the photographs: operators V. Kopylov and S. Duznetsova at the central control console; one of the production shops

11004
CSO: 1841/114

ACHINSK REFINERY STARTS GASOLINE PRODUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Dec 82 p 1

[Article by V. Khrustalev: "Achinsk Now Has Gasoline"]

[Text] Up until now, Krasnoyarsk Kray has been importing petroleum products. But the situation has changed fundamentally now that the production processes of the first complex of the Achinsk Petroleum Refinery have been started up. As of yesterday, when the first product was obtained--directly distilled gasoline, the kray became a producer. Tens of thousands of tons of petroleum are to be processed by Achinsk workers this year, satisfying the needs of the national economy. And after construction of the plant is finished and its production is raised to its planned capacity, the workers of Achinsk will supply motor and diesel fuel to neighboring regions of Siberia as well.

A triumphant meeting was held at the plant on the occasion of the start-up of the first complex. Mention was made of the shock labor of the best collectives of the "Achinskalyuminstroy," "Orgneftekhimzavody" and "Sibtekhmontazh" trusts and the board of directors of the new enterprise.

11004
CSO: 1841/114

UDC 665.765-404.035.6:532.13

INTERMOLECULAR REACTIONS AND VISCOSITY OF PETROLEUM LUBRICANTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 82
pp 8-11

FUKS, G. I., MARCHEVA, Ye. N. and GALKINA, V. V., All-Union Scientific Research Institute for Petroleum Refining

[Abstract] The key lubricant feature of viscosity depends on the chemical composition of a substance and its molecular kinetic properties. The complex relationship between the temperature of petroleum lubricants and viscosity has been investigated in this article evaluating the numerous empirical formulas developed to describe it. Structural models of liquids and views of the liquid status of substances, (such as those of Frenkel', Kinetic Theory of Liquids, Moscow-Leningrad 1959), showed that low-molecular compounds such as liquid ethane and pentane have a relation of macroscopic viscosity to tmeperature. The authors found this to be true above 150° C, while at low temperatures the molecular and associative components play larger roles. These phenomena are discussed in relation to temperature, Viscosity of lubricants, thickened with polymer additives, is related to molecular mass and concentration. Four temperature-related states are suggested: above 150° C (varying according to lubricant composition) lubricants are normal liquids, while below that temperature they become solutions of associates. Below 50° C, associate component content becomes predominat and they take on polymer-like properties; and below 0° C they are transformed into solid-like substances characterized by critical shear stress and viscosity anomalies. Depressor additives such as "santopur" reduce both coagulation temperature and viscosity at temperatures approaching coagulation. Figures 4; references 24: 20 Russian (1 translation from English), 4 Western.
[97-12131]

UDC 620.197.3:665.7.038

OIL-SOLUBLE SURFACTANTS AS INHIBITORS OF CORROSION IN HYDROCARBON MEDIA

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 82
pp 12-15

SHEKHTER, Yu. N., SHKOL'NIKOV, V. M., ROMANOVSKAYA, A. A. and MIKHAYLOVA, L. O., All-Union Scientific Research Institute for Petroleum Refining

[Abstract] Title substances (SAS) were previously studied in low-polarity petroleum and synthetic sulfonates of varying structure and molecular mass, in alkenylsuccinimides, alkylphenol and alkylsalicylate additives, and their initial compounding established. Others have studied intermolecular reactions of SAS in mineral, semisynthetic and synthetic media, and determined that along with mixed micelles, activated complexes were formed. The authors replaced mineral oils with various complex esters, polyesters and other synthetic liquids that synergistically improved additive quality. Resulting mixtures contained fluctuating activated complexes that apparently caused significant deviations from normal additive behavior in parameters such as temperature and viscosity, volume and surface properties and compatability with other additives. For applications such as aviation lubricants, various thermal and thermooxidational stability problems remain to be solved in the "third generation of additives." Numerous corrosion and wear factors must be combined with high lubrication and penetrating properties in complex colloidal structures containing selected micelle and activated components that will protect metals from mechanical and corrosive wear. Figures 1; references 22 (Russian; 1 translated from English).
[97-12131]

UDC 665.622.43.066.6.001.5

BREAKDOWN OF WATER-PETROLEUM EMULSIONS WITH SURFACTANTS

Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 12, Dec 82
pp 24-25

TRONOV, V. P.

[Abstract] Effective disruption of emulsions in preparing crude oil for refining depends largely on the durability of the dispersion phase (e.g., pitch-asphalt paraffins, porphyrine complexes or solid suspensions) on the surface of water drops. Surface active substances (SAS) and electrical fields have been used to accomplish such breakdown. The author studied results of such procedures in turbulent flows (Industrial Preparation of Crude Oil, Moscow, Nedra, 1977), and determined that the curve for anhydrous carboniferous oil was markedly higher than that for Devonian oil when critical pressure was related to time. In the current study, the author used the method of falling globules to determine effects of demulsifiers on various

types of crude oil. Results showed factors such as a preliminary period of breakdown when few results appear, which must be considered in the preparation process along with actual mixing time. The necessity of suppressing the emulsifiers was also demonstrated, along with the need for breaking the protective coatings on water globules and suppression of the adsorption activity of natural emulsifiers. A method of compounding is suggested to reduce the free surface area of emulsion systems and thus increase the demulsifying capability of the crude oil.
[97-12131]

UDC 66.011+66.048.32

OPTIMAL CONTROL OF A PERIODIC RECTIFICATION PROCESS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 4, Dec 82 (manuscript received 5 Jul 82) pp 881-884

KAFAROV, V. V., academician, VETOKHIN, V. N. and ROZHKOV, A. M., Moscow Chemico-Technological Institute imeni D. I. Mendeleyev

[Abstract] The authors propose a control procedure based on the principle of maximum values, to avoid the rigidity of differential equation approaches that lead to the acceptance of various dubious "givens." The mathematical model proposed has the advantage of reducing the number of calculations required by transforming the initial system to a smaller dimensional system, through the use of "quasistationary" values. The system of differential equations is divided into beginning and basic intervals, which are unequal. Periodic rectification is based on so-called slow components in some equations and fast components in others. The proposed method can be used to calculate optimal control of a process for separating a three-component mixture, reducing the time required for the operation by 60%. Figures 4; references 6: 1 Russian, 5 Western.
[92-12131]

ALLENE, FOREFATHER OF ALLENES

Moscow ZNANIYE-SILA in Russian No 11, Nov 82 p 13

[Article by A. Fin]

[Text] We are talking about the possible uses of only one substance. It is called allene.

Only a few lines are devoted to this gas in the newest chemistry textbooks and when a laboratory of chemistry and technology of allene was organized at the All-Union Scientific Research Institute of organic synthesis in the 1960s, this raised doubts even among specialists:

$$CH_2 = C = CH_2$$

This is its formula. There are two double bonds ready to separate at any moment. The gas is very reactive. It does not exist in nature. Only microconcentrations of allene-like compounds have been discovered in some types of mold fungi. This is all that was known. Is it worth opening a laboratory for a gas that does not exist?

But the time has come to think about allene.

Pyrolysis and breakdown of crude petroleum has now become the only source of ethylene, the main product of polymer chemistry. Gasoline or the heavier fractions of petroleum are distilled rapidly through the pipes of the heat exchanger installed in a chamber with temperature of 1,000-1,2000 degrees Celsius. The long chains of gasoline molecules break apart due to temperature until the shortest chain--ethylene--is formed. But synthesis also proceeds along with decomposition. As a result only 26 percent of the yield goes to ethylene. The remaining 74 percent is a mixture of more than 100 different "wastes." And among them are hidden only 3 percent allene, let us say frankly a very inconvenient "waste." Unlike the other waste gases which are burned off, allene produces too many vapors. And to avoid this, allene is first hydrogenated--hydrogen is added.

A separate expensive reaction vessel is required for hydrogenation. But the time has come to construct large-capacity units with productivity of 300,000 tons or more of ethylene annually. Engineering calculations showed that the

volume of the hydrogenation equipment will increase much more rapidly than the volume of the installation itself and can surpass it in dimensions. Moreover, it is one thing to burn 600 tons of allene annually and another to burn 8,000 tons. Use of it would be an important achievement in development of waste-free production. But why allene specifically? It is obvious that the traditions of Russian chemistry, which has long been interested in unsaturated compounds, played a role. Incidentally, the first polyethylene was produced at the end of the 19th century by Butlerov, a Russian chemist. Purely scientific interest also frequently played a role, since almost nothing was known about allene except its formula.

In any event, the laboratory was opened, from the very beginning posing for itself specific problems in development of an industrial technique for production and utilization of allene. We emphasize the term "industrial". Industry has two basic laws--profitability and total safety.

But it was difficult to talk about safety. As the laboratory head, Doctor of Chemical Sciences Anatoliy Markovich Taber, now recognizes, upon beginning to work with allene, the investigators experienced a very real fear. The "leading figures" said that one only had to look at this gas and it explodes. In 1913, one of the leading chemists, Sergey Vasil'yevich Lebedev, produced synthetic rubber based on allene and this was some achievement! But the rubber was unsuitable and no experience remained in practical work with allene. In short, they had to begin anew.

How does the gas behave at different temperatures? What happens to it under pressure? What is its molecular weight? What is its boiling and melting points? What is the heat of formation, vapor pressure and many many other parameters? Some of the main parameters are critical pressure and temperature. The experiments did not proceed without surprises. Once, one of the colleagues could not tolerate the monotony of the research. He pumped the allene into an autoclave and immediately heated it to 800°C. There is as yet no scientific explanation for what happened, but the gas did not explode at that time. Further tests showed that it was supposed to "explode" even at 120 degrees. When this was determined, Anatoliy Markovich became very fearful. The fact is that the laboratory operates in one of the spaces of the old university, in the same wing where Nikolay Dmitriyevich Zelinskiy's apartment-museum is located, and whose memory is very dear to all the laboratory colleagues. And an explosion, even of a very small amount of gas, in a museum...

Investigations of the properties of the gas showed that it can be used to weld metals instead of propane-butane mixtures. If several percent propane or propylene is added to it, there is no longer an explosion hazard. Economic calculations showed that the cost of allene can be one-fourth lower than that of the cheapest acetylene. This was even more advantageous, the more so since acetylene is not without danger.

The next phase of the work was ahead--to produce plastic based on allene. Its properties could be predicted, although only approximately. The scientists posed a difficult task to themselves: the technology should be developed for already existing installations which synthesize polyethylene. If the

experiments were successful, this would guarantee a direct path into industry for the new material. On the other hand, the difficulties and complexities were clear. They also wanted to use the catalysts already used in polyethylene production.

These catalysts--a mixture of titanium tetrachloride and organic aluminum compounds--are very unstable. When water is added to the reaction vessel, they break down and burn in air.

And a "crazy" experiment was conducted here.

The dream of every chemist is to achieve polymerization of gas in water since this is safe, simple and inexpensive. This cannot be done with ethylene: even in the presence of a catalyst, ethylene formed short chains of 2-3 molecules in water, after which the catalyst broke down. Allene, an abnormal gas, behaved quite differently. A white powder began to precipitate out in the water, colored pink from the catalyst, at 60 degrees and low pressure of only two atmospheres. And in each particle of powder were chains of tens of thousands of molecules.

This was polyallene, the world's first polymer based on allene!

And to what extent the process was simplified! Compare yourself: a large, four-story building with a pressurized reaction vessel for synthesis of polyethylene or a water tank. There has hardly been a time when it was possible to select the conditions and allene additives stabilized the rhodium catalyst so much that polymerization of ethylene itself in water became possible.

But this was later. At that time, the first 5-10 grams of powder were shown to everyone. At that time, the work of the laboratory seemed to be a harebrained scheme. Therefore, they travelled to Leningrad, taking with themselves a tank of pure ethylene besides the powder.

The Leningrad NPO [Scientific Production Association] Plastpolimer was, if one can express it thusly, the law-giver of chemical fashion and if its specialists said that the process was good, then no one would argue.

The experiment at Leningrad made the Moscow workers nervous. A. M. Taber looked unblinkingly at the pressure gauge of the installation where the capability of polymerization was being checked and he waited until the pressure dropped. This meant that the reaction was finished. But the pressure did not drop. He waited and again checked himself and at the same time checked the experimental conditions: whether the solution was pure enough and whether the catalyst was quite different than that needed. All the reaction periods had passed and it became clear that nothing had happened, but he had a good many reasons ready. The reactor was opened and it was full of polyallene. The reaction had proceeded. But what about the pressure and the pressure gauge? It had simply malfunctioned.

Tests of the new material showed that it is 1.5 times harder than polyethylene, almost three times more wear-resistant and has a melting point of

approximately 300 degrees! And even so Taber and his colleagues decided to part with it. The new polymer was unstable. It oxidized and absorbed water from the air. Like burdock, it formed a chain with all chemical substances located nearby. This was such a blow that they threw up their hands.

Its instability induced reconsideration of polyallene. If the polymer "forms chains" with unnecessary substances, this is undoubtedly a bad thing. But could one force it to form a chain with given chemical substances and convert it to a unique cross-linking machine? Could it be forced to cross-link chemical substances? The idea was very fruitful.

Phosphorus additives to polyallene made it possible to produce a non-flammable plastic with bactericidal properties. Polyallene and silicon is indispensible to the cable industry. It essentially does not oxidize, has high melting point and this permits its use under severe conditions and it scares rodents away. Due to the fact that they gnaw through the protective sheathing of cables the country loses a lot of metal.

Yet another new polymer--polyethallene--was produced on an allene and ethylene base. Probably each one attempted to paint something on polyethylene film and ascertained that this is practically impossible. Polyallene additives to polyethylene "enliven" its molecule and increase adhesion and "sticking." The paint adheres to polyethallene film no worse than to paper. Only several percent of the polyallene does the same thing as expensive and inconvenient spark treatment or irradiation of polyethylene. And it does even more.

One can, for example, construct a house of sand by using ethallene. The insatiable allene firmly cross-links sand particles to inert polyethylene.

Purely applied experiments were conducted, but the scientific work did not remain idle--A. M. Taber and his colleagues decided to introduce a new class of industrial compounds based on allene into petrochemistry--dimethylcyclobutanes.

Two, three or four allene molecules that construct a three-dimensional composite is an excellent raw material to produce synthetic rubbers with almost natural structure.

Nickel was selected as the catalyst--theory suggested that there is no better catalyst, but the experiments were hardly successful. They tried to dissolve nickel. And the results were not encouraging. The next 8 years of work passed in the search for a suitable catalyst. During this time, a remarkable, very stable catalyst for propylene and ethylene based on nickel was developed, but cyclobutanes could not be synthesized at all. It is probably very difficult to admit how many years passed on an erroneous path, but Taber and his colleagues admitted this. They returned to high temperatures.

Further developments were successful. The isopropenyl esters were especially interesting. This is a raw material, on the basis of which cosmetics, synthetic leather, glues and vitamin E, required for the muscles to work, could

be made. Vitamin E is contained in oils and the green parts of plants, but in very small quantities.

Isopropenyls were produced in a very complex manner and by multistage synthesis. The process suggested by the laboratory of the chemistry and technology of allene contains only one stage and can proceed continuously.

This is the history of allene. But it is not finished.

6521
CSO: 1841/116

UDC 678.046.01

DIFFUSION OF LOW MOLECULAR WEIGHT SUBSTANCES THROUGH REINFORCED POLYMERIC MATERIALS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 5, Sep-Oct 82 (manuscript received 6 Apr 82) pp 588-589

INIKHOV, G. L., MATVIYENKO, N. N., GORELENKOV, V. K. and KARTASHOV, E. M.

[Abstract] A mathematical description of the diffusion of low molecular weight substances in the liquid phase through reinforced pellicular polymeric materials is presented. The case considered is that in which the textile reinforcing base is inside the polymeric material, thinner than it and with a low swelling limit. The presence of heterogeneity and relaxation processes in the diffusion requires the use of a hyperbolic diffusion equation. Introduction of a flow function with coordinates along the axes of symmetry of the textile base simplifies the problem. The concentration field of the low molecular weight substance in the polymer is described in terms of effective diffusion coefficient, maximum concentration in the polymer and sorbtion by the textile base. Figures 1; references 5: 1 Russian, 4 Western.
[67-12126]

UDC 541.64+547.313.3

ETHYLENE POLYMERIZATION IN MODIFIED ACTIVE SYSTEMS BASED ON $VOCl_3$

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 267, No 4, Dec 82 (manuscript received 5 Jul 82) pp 860-862

ZAVOROKHIN, N. D., BELEKHOV, S. A., FAVORSKAYA, M. V. and ZHUBANOV, B. A., Academician, Institute of Chemical Sciences, KaSSR Academy of Sciences, Alma-Ata

[Abstract] Complex organometallic catalysts, based on $VOCl_3$, for olefin polymerization have a rapid initial rate which quickly declines, due to

reduction of vanadium by organic aluminum compounds. The authors discuss stabilization of such catalysts by CCl_4 and diisoamyl ester. They note that both have been added to n-heptane-AlR_2C-$VOCl_3$ in order to obtain the desired activation. A successful variant of n-heptane-$AlEt_2Cl$-($VOCl_3 \cdot n CCl_4$ + diisoamyl ester had lower activity but maintained it, with catalyst activity depending on the ratio of Al to diisoamyl ester. At a reduced temperature (<40°C) is behavior was analogous to the two-component system. At 60°C in the presence of CCl_4, alkylation of $VOCl_2OR$ by diethylaluminum chloride led to complex centers with stable operation. Figures 2; references 15: 9 Russian, 6 Western.
[92-12131]

PRESENT AND FUTURE POLYURETHANE PRODUCTION

Minsk PROMYSHLENNOST' BELORUSSII in Russian No 11, Nov 82 pp 50-51

[Article by I. Kachur, chief technician of Belorussian Association Belarus'-rezinotekhnika and G. Levina, senior engineer-technician]

[Text] It happens in industrial production that the material which was little known yesterday achieves universal popularity. Thus it happened with polyurethane--a comparatively new high molecular compound, the structure of which includes a considerable number of urethane groups. Judge for yourself: the worldwide consumption of polyurethane products has increased more than tenfold during the past 10 years and continues to grow at rapid rates, despite its comparatively high cost.

The reason is the broad recognition of polyurethane--its exceptionally high operating qualities that exceed not only the properties of all types of rubbers, but of some other materials as well.

Cast polyurethane elastomers enjoy especially high demand. Large-size products of the broadest assortment--tires for intraplant, including monorail transport, blocks for bending, cutting, drawing and shaping of cast metal and much much more--are manufactured from them. Let us also note that a supplementary vulcanization stage is unnecessary in most cases for cast polyurethanes and products are manufactured directly during synthesis by free pouring, vacuum and centrifugal casting methods.

The production of molded products from cast polyurethanes was organized at our plant in 1978. The casting machines installed here permit manufacture of products weighing from 200 grams to 700 kilograms. These include the runners for subway escalators, which are reinforced rollers, solid tires to outfit rotary filters, rollers to transport pipes in construction of gas pipelines, chain gears for the Buran snowmobile and so on. The future includes the use of cast polyurethane for lining of equipment subject to intensive abrasive wear and also operating in aggressive media: the chutes of screens and ore-crushing mills in the mining, ore and non-metallic industry. The use is extremely efficient here. For example, the use of polyurethane sheets instead of rubber increased 100-fold the resistance of the lining of the working chambers of such high-performance vibration-tumbling installations as the UVI-25 and VMI-104A. Together with the Kondopoga Stone Processing Plant, the Bobruysk

Machine Building Plant imeni Lenin and other enterprises and institutions, investigations are under way to assimilate polyurethane in the designs of pumps, hydraulic cyclones and flotation machines. Products manufactured from L-167 adiprene for the Plant imeni Lenin have already been partially tested. The results are good. Work is under way with a number of enterprises on the use of polyurethane to manufacture the sieves of screens for sizing granites, limestones, coal, ore and so on. The durability of these sieves was 30 times higher than metal sieves. We have been manufacturing the rims for Tyumen snow and swamp buggies from polyurethane for 3 years now. Development of polyurethane rims for caterpillar drive gears and in other machines has begun.

The use of polyurethane for lining the shafts in machines for cutting glass fibers in textile mills and in the metallurgical industry is of great interest. A successful design of molds for free casting of the linings of shafts has been found that permits the output of high-quality products.

A broad field of application of polyurethane products is the seals of hydraulic presses. Thus, the use of polyurethane for test presses of one of the pipe plants increased the resistance of the seals 50-60-fold compared to rubberized fabric seals. They are also effective in stamp and die equipment. Products made from them can be used as male and female dies and as shock absorbers for the most diverse operations: cutting, piercing, punching, bending, distribution, edging and shaping.

The undoubted recognition of the unique properties of the new material is also indicated by the addresses of our customers: Komsomolsk-na-Amure, Blagoveshchensk, Irkutsk, Perm, Sverdlovsk, Murmansk, Leningrad, Baku and Nalchik...

We are also working with Belorussian enterprises--the Volkovysk Casting Equipment Plant, the Minkashevichi Combine of Non-Metallic Materials, the Mogilev PO Khimvolokno, the Bobruysk Machine Building Plant imeni Lenin, the Soligorsk PO Beloruskaliy and the Novopolotsk PO Polimir. All of them are our business partners. The latter circumstance is especially important since introduction of a progressive structural material--polyurethane--in the most diverse sectors of the national economy of our republic will make possible a considerable reduction of metal consumption, will reduce laboriousness and will increase the reliability and durability of products.

6521
CSO: 1841/115

YAROSLAVL PLANT SUPPLIES TOOLS FOR MAKING OVERSIZED TIRES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Jan 83 p 2

[Article by Yu. Belyakov: "Machine Tools for Giant Tires"]

[Text] We are at the Yaroslavl "Polimermash" Plant's assembly shop. There are rows of machine tools being born in the light, spacious building--from pedestals just delivered here to almost finished machine units.

"Equipment produced in Yaroslavl has been installed in almost all of the country's tire and industrial rubber plants. This equipment is also well known abroad. For example rollers bearing the "Polimermash" brand have been purchased by England, Sweden, Switzerland, Denmark, Bulgaria, Hungary, the GDR and Yugoslavia. This week another machine unit for preparing rubber mixtures was sent to France. Machine tools for assembling motor vehicle and tractor tire casings are being used extensively in the CEMA countries," explained the plant director, B. Medvedev.

Among the equipment presently being assembled there are several machine tools with dimensions that set them apart. One of them is already completed and adjusted. V. Dubov's and V. Vorontsov's fitter brigades, which assembled the unique machine unit, are preparing it for shipment to the buyer. It is intended for assembly of tire casings for 110-ton "BelAZ" quarry dump trucks. The diameter of each tire is over 3 meters. This is why the dimensions of the unique machine unit are so great and its manufacture was so complex.

Here is one more important detail. Until recently our country had been purchasing such tire casings abroad. Assimilation of production with the new machine tools from Yaroslavl will make it possible to halt imports of expensive products.

The machine tool was planned by specialists of an institute in Yaroslavl, the NIIshinmash. And it will operate in Belorussia, in the "Bobruyskshina" Production Association. This is already the eighth such unit manufactured in Yaroslavl. The first two underwent tests at the experimental plant of the Scientific Research Institute of Oversized Tires in Dnepropetrovsk, after which they were recommended for series production. They are now in use, proving that the design concept of the planners was correct and that the work proficiency of the manufacturers is irreproachable. Another five machine tools have been

sent to Bobruysk, where they are being installed in the tire plant's assembly shop. In the third year of the five-year plan Yaroslavl's workers will manufacture, and deliver to Belorussian tire plants, another 12 machine units for assembling tire casings for heavy trucks.

This is not the only new item of the Yaroslavl machine builders. Here as well, at "Polimermash," an experimental model of a highly mechanized machine unit for assembling tire casings for 180-ton "BelAZ" quarry dump trucks was assembled in 1982. Now this machine unit is also undergoing industrial testing in Dnepropetrovsk at the experimental plant of the Scientific Research Institute of Oversized Tires. It will not be long before these machine tools will be placed into series production as well.

Moscow and Dnepropetrovsk, Voronezh and Baku, Belaya Tserkov and Chimkent, Bobruysk and Nizhnekamsk.... It is difficult to list all of the cities in which equipment bearing the brand of the Yaroslavl "Polimermash" Plant is used. It is dependably serving the tire manufacturers and creators of various industrial articles from rubber. A no less important characteristic of the Yaroslavl machine tools is their high productivity. The machine builders devote special attention to this indicator. The productivity of the equipment, production of which is planned to start in the current five-year plan, must be a time and a half greater than that of equipment produced in the past five-year plan.

11004
CSO: 1841/114

UDC 630*866/.867:331.876.4

WOOD CHEMICAL PRODUCTION AT SIXTIETH ANNIVERSARY OF FOUNDING OF USSR

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, Aug 82 pp 4-5

FEDORYSHIN, V. N., chief engineer, All-Union Production Association "Soyuzleskhimproduktsiya"

[Abstract] The author reviews advances in this industry to the present since the first major plant was begun in 1921. In recent years, he claims, the association has fulfilled and exceeded its plan quotas. New technology has been applied to produce such products as medicinal racemic camphor from soft resin turpentine at the Neyvo-Rudyanskiy plant, latex glue for the paper cellulose industry at the Verkhoturskiy plant, and granulated EM-3 rosin for technical resin production at the Ziminskiy plant. Wood chemical cooperation with agriculture has also resulted in production increases for potatoes and vegetables. Results of "socialist competition" for production in various categories are also presented.
[94-12131]

UDC 630*863.1

ATTEMPTED PRODUCTION OF FEED SUPPLEMENTS FROM ASPEN SAWDUST AND SHAVINGS

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, Aug 82 pp 12-14

BYKOV, V. A., KOROL'LOV, I. I., LEVANOVA, V. P., BOYKO, V. I., LIVANOVA, R. P. and YABLOCHKINA, S. P.

[Abstract] The authors set out to develop test feed supplements using accepted hydrolytic processing methods, to pinpoint conditions necessary for full production of such supplements and to study means of neutralizing the hydrolyzed mass, drying and final preparation of the feed supplement before use. The first series of tests was conducted in a test chamber of 3 cubic meter capacity using aspen sawdust, neutralizing the hydrolyzed mass either

directly in the chamber with ammonia or after unloading using gaseous ammonia. Average pH was 5.5-6.5, which was regarded to be acceptable. The cellolignin of the feed supplement had 26% sugars by total mass, or 42% sugars by cellulose mass. Tests of toxicity at the Leningrad Veterinary Institute determined the feed supplement to be safe for use and beneficial. Further production tests were conducted at the "Kirishi" specialized Production Associaton in Leningrad Oblast' and at the Leningrad Hydrolysis Plant and with 18 cubic meter capacity. The final product was mixed with 70% dried feed supplement and 30% combined fodder, it fulfilled specified requirements and produced positive results.
[94-12131]

UDC 620.193.4:676.02

AVOIDING CORROSION OF EQUIPMENT USED FOR CONDENSING POST-FERMENTATION SEDIMENT OF SULFITE-CELLULOSE PRODUCTION

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST' in Russian No 8, Aug 82 pp 25-26

KACHANOV, V. A., VOLKOVA, L. M., NIKITIN, D. G., SHIRYAYEVA, L. V. and BARABASH, O. K.

[Abstract] Both domestic and imported sulfite-cellulose production equipment is made from nickel-chrome steel with molybdenum added, while auxiliary equipment is generally made from "18-10 steel." The authors studied numerous variant steels in seeking a more economical construction material. Corrosion resistance of basic steels was tested on samples 3-5 mm in thickness, while weld joints were tested in their initial status after welding by either arc welding of steel or argon arc welding of titanium. General, pitting and inter-crystalline corrosion were then measured on samples 20 x 80 mm, in a liquid mixture containing process sediment and alkali. Among chrome, nickel-chrome and nickel-molybdenum-chrome steels, austenite-ferrite nickel-chrome and austenite steels, the most favorable results with economical steels were obtained using 08Ch21N6M2T steel, whose samples and weld seams were equal to the more expensive 10Ch17N13M2T steels now commonly used. References 7 (Russian).
[94-12131]

UDC 666.11.07+621.315.612

GLASS FOR ELECTRONIC INDUSTRY

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 5, Sep-Oct 82 pp 518-525

ZHURAVLEV, G. I., professor, Department of Chemical Technology of Glass and Devitrified Glass, Leningrad Technological Institute imeni Lensovet

[Abstract] The composition and some physical properties of 46 types of Soviet glass used in the electronics industry are tabulated. Metal-glass junctions require transitional glass with high coefficients of thermal expansion, particularly for high-power electrovacuum technology. Glass types C95-3, C94-1, C93-1 and C93-2, used for television picture tubes, have the largest production volumes. Another important application area is the development of glasses which avoid use of metals currently in short supply. These can be divided into alkali-alkaline earth silicate and phosphate types, both containing transition metal oxide cohesion activators. Glass for titanium junctions and for use with aluminum alloys, easily fusible glass, glass cements and composite glass are the subjects of considerable study. All glass suitable for the electronic industry requires the widest possible softening temperature range, coefficients of thermal expansion close to that of the metals used in junctions, stability in an electric field, a temperature where the volume specific resistance equals 100 ohm cm of 500-600°C, low surface conductivity, chemical stability and suitable gas permeability properties. References 126: 62 Russian, 64 Western. [67-12126]

UDC 666.19.666.11.01:666.192:539.219.1

MATERIALS BASED ON VITREOUS SILICON DIOXIDE

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D. I. MENDELEYEVA in Russian Vol 27, No 5, Sep-Oct 82 pp 525-530

SOLOMIN, N. V., professor, doctor of mechanical science

[Abstract] The properties and uses of quartz glass are reviewed. Transparent quartz glass has a tetrahedral arrangement of atoms in the crystal lattice, with the number of tetrahedra per macromolecule varying with temperature. Crystallization, which lowers glass stability, is strongly affected by the presence of impurities. Quartz glass is less stable than quartz to water in a 310° autoclave. Contrary to previous belief, it can be reinforced with a surface layer containing 8% titanium dioxide. The main advantages of quartz glass are its high temperature of inelastic deformation, resistance to temperature inequalities and transparency. Objects made from quartz glass are used in chemistry, optics, astronomy, metallurgy, vacuum technology, electronics and medicine. Nontransparent quartz glass contains 0.2-0.4% coloring impurities which adversely affect high temperature deformation properties. Quartz glass ceramic, first synthesized in 1941, is formed by a liquid deformation mechanism. It has excellent thermal stability, mechanical properties which depend on the amount of firing and is widely used in metallurgy and the space industry. Quartz foam glass ceramic differs from other ultralight-weight, fireproof materials in its extremely high thermal and mechanical stability and dielectric properties. Quartz bentoceramics are the most recent developments in this field. References 46: 44 Russian, 2 Western.
[67-12126]

CSO: 1841

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